

Effect of advanced oxidation pre-treatment on membrane filtration parameters of dairy waste water

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The dairy industry is generally considered to be the largest source of food processing wastewater in many countries. The dairy industry generates wastewaters characterised by high biological and chemical oxygen demand representing their high organic content. The main contributors of dairy effluents are carbohydrates, proteins and fats originating from milk. Among available technologies for wastewater treatment, membrane technology, especially ultrafiltration (UF) of dairy wastewater yields a high permeate flux at low transmembrane pressure, but its permeate water is not reusable as it contains too much lactose [1, 2]. Advanced oxidation processes (AOPs) are widely used in the fields of water and wastewater treatments and are known for their capability to mineralise a wide range of organic compounds [3]. AOPs also have some other effects on the filtration procedure, e.g. the microfloculation effect of ozone may play a significant role in increased elimination efficiency, causing a decreased level of fouling and increased gel formation [4].

The aim of the present work was to compare the effect of ozone pre-treatment and the Fenton-reaction on the some dairy wastewater component, then to investigate the effect of pre-ozonation on the some filtration parameters, like permeate flux, fouling, and retention of pollutants, characterised by chemical oxygen demand.

Model solutions were prepared from milk powder. The ozone-containing gas was bubbled continuously through a batch reactor during the treatment. The ozone concentrations of the bubbling gas before and after the reactor were measured with a UV/VIS spectrophotometer at 254 nm. Ozone was produced from oxygen with a flow-type ozone-generator. The UF experiments were carried out in batch stirred ultrafiltration cell.

In the first series of experiments the degradation of some component of dairy wastewater, like lactose, casein, milk fat, whey and model dairy wastewater were investigated. It was found, that the pre-treatment by the AOPs decreased the chemical oxygen demand, and in the case of casein, whey and fat containing solutions the turbidity of the solutions also decreased. In the next series of experiments the untreated and pre-treated samples were ultrafiltered, and the fluxes were followed during the filtration procedure. It was found that flux with the pre-treatments decreases, due to arising degradation by-products. The retention of the turbidity and the COD values were compared after ultrafiltration of untreated and pre-treated samples. It was found that the Fenton-reaction has high elimination efficiency due to its simultaneous coagulation-flocculation and oxidation effects, but the ozone pre-treatment also enhanced the retention of pollutants.

The effect of both ozone and Fenton treatment on biodegradability of the compounds, and the concentrate of the membrane filtration were also investigated. The results indicate that in most cases the pre-treatments enhanced the biodegradability of the pollutants, allowing the further biological treatment of the concentrated pollutants.

Keywords: ozone; Fenton reaction; membrane filtration dairy waste water; biodegradability

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Electrospinning and Material for Lithium

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Electrospinning is a unique process that produces nanofibers with a thinner diameter than conventional spinning.

An anode material for lithium-ion batteries (SCNFs), was fabricated by the electrospinning of silicon nanoparticles. These nanofibers enhance electrochemical performance. These contribute to the enhancement of capacity.

Coaxially electrospun nanofibers (SCNFs) were fabricated for use as an anode material for lithium-ion batteries. The nanofibers were carbonized at 1000 °C to form a carbon shell. The electrochemical performance was confirmed by scanning electrochemical microscopy (SECM). The SCNF electrode with 1 wt% SiNPs showed a retained capacity of 500 mAh/g and a coulombic efficiency of 50% (1350 mAh/g). In the SCNF electrode, the CNTs in the core

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